IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Kenneth Turos
Sole Inventor:	Kenneth Turos
For:	Shaping Tool
Attorney Docket Number:	2067.030
Express Mail Label Number:	EV233997598US

NONPROVISIONAL U.S. PATENT APPLICATION

To: Commissioner for Patents
MAIL STOP NEW APPLICATION
P.O. Box 1450
Alexandria, Virginia 22313-1450

Respectfully submitted by:

LAW OFFICE OF RAY R. REGAN, P. A.
Ray R. Regan, Esq.
Registration No. 36,899
Mailing Address:
P.O. Box 1442
Corrales, New Mexico 87048
Street Address:
40 Sego Lane
Corrales, New Mexico 87048
Telephone (505) 897-7200
Facsimile (505) 897-7201
E-mail : rayregan@rayregan.com

CROSS-REFERENCE TO RELATED APPLICATION

This application is a nonprovisional patent application that claims benefit under 35 U.S.C. §119(e) to provisional application number 60/422577 filed October 30, 2002.

FIELD OF THE SHAPING TOOL

The shaping tool pertains generally to the field of machine tools. More particularly, the new shaping tool is useful for, among other uses, machining, refinishing, balancing, resurfacing (collectively, "shaping") a rotating workpiece. The shaping tool is particularly, but not exclusively, useful for shaping a vehicle brake drum regardless of the size or dimensions of the brake drum.

BACKGROUND

Machines used to shape workpieces generally include a driving motor, a driven rotatable shaft on which a workpiece may be removably mounted, and retaining devices attachable to the shaft for demountably holding the workpiece. One such workpiece is a motor vehicle brake drum. Brake drums become worn from use on vehicles. Worn brake drums, however, may be machined, refinished, balanced, and resurfaced (collectively, "shaped") for subsequent re-use. Tools are available to reciprocally engage and shape surfaces of brake drums for re-use (collectively, "shaping work"). Shaping work has become increasingly difficult, however, because the size of brake drums has diminished in recent years.

Tools available for shaping a workpiece such as a brake drum include boring bars. Conventional boring bars include a unitary monolithically formed bar with a cutting or shaping device (collectively, "shaping cutter") attached to one end of the unitary bar. As the size of brake drums has decreased, however, conventional unitary boring bars have proven unsuccessful in shaping the smaller sized brake drums on many machines. A craftsman seeking to insert a shaping cutter attached to a conventional boring bar cannot insert the shaping cutter into the smaller brake drums. The shaping cutter may not fit within the angle formed between the boring bar and the longitudinal axis through the center of the drum and the rotating shaft of a conventional brake lathe adapter or other apparatus holding a rotating brake drum. Shaping cutters attached to conventional boring bars cannot be positioned within the decreasing space between (a) a brake drum mounted on a brake lathe tool or adapter, and (b) the arbor shaft and

the adapter that holds a brake drum during operation and performance of the shaping work. The amount of travel, or adjustment, between the device designed to hold a boring bar during operation, and the boring bar itself, is limited as regards inboard movement and positioning, and therefore cannot vary to fit into a wide range of brake drums. Providing a variety of variously sized boring bars and shaping cutters not only is too expensive, it also requires the craftsman performing the shaping work to change boring bars depending on the size of the brake drum to be worked on, and therefore adds excessively to the cost of shaping.

Therefore, a previously unaddressed need exists in the industry for a new, useful and improved apparatus, and method for using such an apparatus, that provides a variable angle shaping tool and dimensionally variable shaper or cutter head (collectively, "cutter") capable of machining, refinishing, balancing, or resurfacing a brake drum regardless of the applicable size or dimensions of the brake drum.

SUMMARY OF THE SHAPING TOOL

The shaping tool includes a swivel arm or swivel member (collectively, "swivel member") to which a cutter is removably mountable. The swivel member is variably positionable in relationship to the longitudinal axis through the length of an arm. A coupler is provided to demountably connect the arm and the swivel member. As used in this document, the term "coupler" includes in one embodiment (i) a slot and two bar extensions formed in one end of the arm, (ii) a bore formed through each of the two bar extensions, and (iii) a tongue formed in one end of the swivel member that is removably and rotatably mountable in the slot formed between the two bar extensions of the arm. A hole is formed in one end of the tongue. A partially beveled edge is formed in the tongue. The partially beveled edge is positioned in the slot so that the partially beveled edge will make contact with the back surface of the slot at a desired point in rotation of the swivel head in relationship to the arm, restricting further movement, and thus contributing to locking the swivel member in a desired position during operation. A connector is provided for rotatable insertion through the bores and the hole for rotatable and removable connection of the swivel member and the arm. The cutter is removably connectable to the other end of the swivel member.

In another aspect and embodiment of the shaping tool, the coupler of the shaping tool includes a slot and two bar extensions formed in one end of the swivel member, a bore formed

through each of the two bar extensions, and an arm shaped with a tongue at one end for removable mounting on the swivel member. As will be evident to one skilled in the art, other aspects and embodiments of the shaping tool are possible. The coupler of the shaping tool may be practiced in a variety of manners and shapes allowing the arm and the swivel member to be removably and rotatably connectable, and to be locked into a desired position or attitude during operation.

As used in this document, the term "attitude" means the positioning of the cutter in relationship to a surface of a workpiece to be shaped during operation. Thus, the arm of the shaping tool is removably mountable on a device for positioning the shaping tool to perform shaping work on a rotating workpiece (collectively, a "keeper"). The keeper is positionable adjacent an arbor, and allows a craftsman to insert the end of the swivel member holding the cutter within a rotating workpiece such as a brake drum to perform the shaping work. The shaping tool may be locked into variable desired positions and attitudes during operation.

The foregoing has outlined broadly the more important features of the invention to better understand the detailed description that follows, and to better understand the contribution of the present shaping tool to the art. Before explaining at least one embodiment of the shaping tool in detail, it is to be understood that the shaping tool is not limited in application to the details of construction, and to the arrangements of the components, provided in the following description or drawing figures. The shaping tool is capable of other embodiments, and of being practiced and carried out in various ways. Also, the phraseology and terminology employed in this disclosure are for purpose of description, and should not be regarded as limiting.

As those skilled in the art will appreciate, the conception on which this disclosure is based readily may be used as a basis for designing other structures, methods, and systems for carrying out the purposes of the present shaping tool. The claims, therefore, include such equivalent constructions to the extent the equivalent constructions do not depart from the spirit and scope of the present shaping tool. Further, the abstract associated with this disclosure is neither intended to define the shaping tool, which is measured by the claims, nor intended to be limiting as to the scope of the shaping tool in any way.

The novel features of this shaping tool, and the shaping tool itself, both as to structure and operation, are best understood from the accompanying drawing, considered in connection

with the accompanying description of the drawing, in which similar reference characters refer to similar parts, and in which:

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a perspective view of the shaping tool in an operative environment extending into a brake drum that is mounted on a brake lathe;

Figure 2 is a perspective view of the shaping tool in an operative environment beside a brake lathe with the brake drum removed;

Figure 3 is an exploded perspective view of components of one embodiment of the shaping tool;

Figures 4A and 4B are perspective views of the shaping tool showing the various angles of attitude and position provided by the swivel member;

Figures 5A and 5B are top plan views of the shaping tool showing the various angles of attitude and position provided by the swivel member, and the effect of the partially beveled edge of the tongue; and

Figures 6 shows an alternative embodiment of the coupler of the shaping tool.

DESCRIPTION OF EMBODIMENTS

Briefly, as shown by cross-reference between Figures 1 through 6, the shaping tool 10 in its broadest aspect includes a swivel member 12 to which a cutter 14 is removably mountable. Swivel member 12 is positionable on an arm 14 and variably positionable in relationship to the longitudinal axis of arm 14 as perhaps best shown by cross-reference between Figures 4A and 4B. A coupler 48, as perhaps best shown in Figure 3, is provided to demountably connect arm 14 to swivel member 12. As used in this document, the term "coupler" includes in one embodiment (i) a slot 18 and two arm extensions 20a,b formed in one end of arm 16, (ii) opposing bores 22a,b formed through two arm extensions 20a,b, and (iii) a tongue 24 formed in one end of swivel member 12 that is removably mountable in slot 18 between two arm extensions 20a,b of arm 14. A hole 26 is formed in tongue 24. A partially beveled edge 28 is formed in tongue 24, and is perhaps best shown by cross-reference between Figures 5A and 5B. Partially beveled edge 28 is positioned in slot 18 to enable partially beveled edge 28 to make contact with the back surface 30 of slot 18, thus contributing to the capability of locking swivel member 12 and cutter 14 in desired positions and attitudes during operation. During operation of

shaping tool 10, a craftsman may adjust swivel member 12 in an acute angle formed in relationship to the longitudinal axis through arm 16 varying from zero degrees through approximately 35 degrees. A connector 32 is provided for rotatable insertion through bores 22a,b and hole 26 for rotatable and removable connection of swivel member 12 and arm 16. Cutter 14 is removably connectable to the other end of swivel member 12. As shown by cross-reference between Figures 1 and 2, any of a variety of keepers (not shown) may be used to removably mount shaping tool 10 adjacent to brake lathe adapter system 34a-b and arbor 36 to enable a craftsman to perform shaping work with shaping tool 10 on inner surface 44 of brake drum 40.

More specifically, referring by cross-reference between Figures 1-2, shaping tool 10 is shown in an operative environment positioned for operation in relationship to a brake lathe adapter system 34a-b mounted on a rotatable arbor 36 to which a workpiece 38 such as a brake drum 40 has been fixed for shaping by securing brake drum 40 with an arbor nut 42. Exemplary embodiments of brake lathe adapter system 34a-b and of arbor nut 42 by the same sole inventor of shaping tool 10 disclosed in this document are shown respectively in U.S. Patent No. 6,279,919 B1, issued August 28, 2001, U.S. Patent No. 6,554,291 B1 issued April 29, 2003, and U.S. Patent No. 6,631,660 B1 issued October 14, 2003. As shown in Figure 1, brake drum 40 generally includes an inner surface 44. Cutter 14 is shown in contact with inner surface 44 of brake drum 40. As shown in Figure 2, a craftsman using shaping tool 10 may position swivel member 12, and therefore cutter 14, in a wide variety of positions and attitudes for shaping work in relationship to the fixed rotation of arbor 36 and brake drum 40 during operation.

Even more specifically, Figure 3 shows an exploded perspective view of components of one embodiment of shaping tool 10. As shown, arm 16 is a generally elongated body 46. Arm 16 is shown to be hexagonal in cross-sectional shape for greater ease of handling and mounting by a craftsman conducting the shaping work. As will be evident to one skilled in the art, however, the cross-sectional shape of arm 16 is not a limitation of shaping tool 10.

As shown in Figure 3, shaping tool 10 also includes coupler 48. Also as shown, arm 16 includes a distal end 50 and a proximal end 52. Swivel member 12 includes a leading end 54 and a trailing end 56. Coupler 48 is useful for removably and rotatably connecting arm 16 and swivel member 12. Coupler 48, in one embodiment of shaping tool 10, includes opposing arm

extensions 20a,b monolithically formed in distal end 50 of arm 16. Slot 18 is formed between opposing arm extensions 20a,b. Back surface 30 of slot 18 also is shown by cross-reference between Figures 3, 5A, and 5B. Opposing bore 22b is shown formed with threads 58 matably engageable with threads 60 formed on connector 32. Coupler 48 also includes tongue 24 that monolithically extends from trailing end 56 of swivel member 12. Hole 26 is formed through tongue 24 to be dimensionally comparable to opposing bores 22a,b, and positioned a distance from trailing end 56 of tongue 24 so that a longitudinal axis would extend through opposing bores 22a,b and hole 26 to allow threadable insertion of connector 32 through opposing bore 22a, hole 26, and into opposing bore 22b for adjusting the acute angle A as best shown by cross-reference with Figures 4A and 4B that may be formed between swivel member 12 and arm 16 by rotating swivel member 12 in relationship to connector 32. A craftsman also may adjust and temporarily fix in a desired position acute angle A during shaping work by using key 62 as perhaps best shown in Figure 3. Key 62 may be inserted into recess 64 of connector 32 to loosen or tighten treaded connections such as threads 60.

As also shown by cross-reference between Figures 3, 5A, and 5B, tongue 24 includes partially beveled edge 28. Partially beveled edge 28 allows movement of swivel member 12 around connector 32 through acute angle A. In at least one embodiment of shaping tool 10, a craftsman may vary acute angle A from zero degrees to 35 degrees. Partially beveled edge 28 also engages back surface 30 in slot 18 of arm 16, as perhaps best shown by cross-reference between Figures 5A and 5B. Engaging back surface 30 impedes further rotational movement of swivel member 12 around a longitudinal axis through connector 32, thus contributing to allowing a craftsman to select the desired attitude of cutter 14 in relationship to inner surface 44 of brake drum 40, while also allowing access into brake drum 40.

In one aspect and embodiment of shaping tool 10, swivel member 12 is formed of a cross-sectional configuration of a hexagon to provide ease of handling and mounting for a craftsman. However, to decrease the overall dimensions of swivel member 12 to enhance the capability of allowing a craftsman greater access with shaping tool 10 to smaller and smaller brake drums 40, a substantially triangular section (not shown) is removed from leading end 54 of swivel member 12 exposing an angular flat surface 66 on leading end 54. As also shown in Figure 3, a groove 68 is formed monolithically in angular flat surface 66 to provide two opposing

monolithic flanges 70a,b. Opposing threaded passages 72a,b are formed in the two opposing monolithic flanges 70a,b. Threaded rods 74a,b are provided for threadable engagement with opposing threaded passages 72a,b formed in opposing monolithic flanges 70a,b.

Shaping tool 10 also includes cutter 14, as best shown by cross-reference between Figures 3, 5a, and 5b. Cutter 14, in one aspect and embodiment of shaping tool 10, includes a substrate 76 and what is generally referred to in the industry as an "insert" but is identified in this document as a shaping tooth 78. Cutter 14 is detachably mountable on leading end 54 of swivel member 12 in groove 68 formed in angular flat surface 66. Substrate 76 is configured from a metal stock to have a fore end 80 and an aft end 82. Fore end 80 of substrate 76 is shaped to be substantially triangular. A ledge 84 is provided in fore end 80. Shaping tooth 78, configured from metal stock, in one embodiment of shaping tool 10, is substantially triangular in shape, but as a person skilled in the art will recognize, the shape is not a limitation of cutter 14. A hollow duct 86 is formed through shaping tooth 78. A threaded device 88, such as a screw 90, is included to secure shaping tooth 78 into threaded orifice 92 in ledge 84 of substrate 76 and to permit removal of shaping tooth 78 from ledge 84 of substrate 76. Substrate 76 and shaping tooth 78 may be shaped and configured to smaller than conventional dimensions to assist a craftsman using shaping tool 10 both to access to inner surface 44 of brake drum 40, and to adjust shaping tool 10 to achieve the proper attitude of cutter 14 during operation.

Another embodiment of coupler 48 of shaping tool 10 is shown in Figure 6 as coupler 48'. Coupler 48' is shown to include a swivel member 12' formed with a slot 18' between monolithic extensions 20a',b' in one end of swivel member 12'. Each of monolithic extensions 20a',b' in one end of swivel member 12' is formed with a partially beveled edge 28a',b' for helping to restrict movement of swivel member 12' during operation for shaping work. Also shown in Figure 6 is an arm 16'. Arm 16' is formed with a proximal end 52' and a distal end 50'. Distal end 50' also includes a tongue 24'. Tongue 24' is removably insertable into slot 18'.

While the shaping tool shown in drawing figures 1 through 6 include two embodiments of the shaping tool, the description is intended to be neither exclusive nor limitations. This disclosure is merely illustrative of the presently preferred embodiments of shaping tool 10.

Claim elements and steps in this document have been numbered solely as an aid in

readability and understanding. The numbering is not intended to, and should not be considered as, indicating the ordering or sequencing of elements and steps in the claims.